EXPERIMENT NO.2
ELEMENTARY DISCRETE-TIME SIGNALS

OBJECTIVES:

- To generate and plot a unit sample, unit step sequence, unit ramp, and exponential discrete-time signals.
- To analyze the characteristics of a unit sample, unit step sequence, unit ramp, and exponential discrete-time signals.

PROCEDURE A: DISCRETE-TIME SIGNAL

1. Encode the following command:

```
-->n=0:10;
-->x=(0.8)^n;
-->a=gca();
-->a.thickness=2;
-->plot2d3(n,x);
-->xtitle('Graphical Representation of Discrete-Time
                                    Signal','n','x[n]');
```

2. Observe and draw the figure generated.

3. Re-type the command but this time change `n=10:20;` to `n=-5:20;`. What is the result? (You can use separate paper for your explanation and to show the result).

OBSERVATIONS:

1. What type of discrete-time signal is generated from the command?
2. Change x to a value greater than one and run again the program. What is the result?

PROCEDURE B: UNIT STEP SIGNAL

1. Encode the following command:

```
-->L=4;
-->n=-L:L;
-->x=[zeros(1,L),ones(1,L+1)];
-->a=gca();
-->a.thickness=2;
-->a.y_location="middle";
-->plot2d3(n,x);
-->xtitle('Graphical Representation of a Unit-Step
                                Signal','n','x[n]');
```

2. Change `L=4;` to `L=4;` and then re-type again the other syntax. What is the result? (You can use separate paper for your explanation and to show the result).

3. Change the value of `a.thickness=2;` to `a.thickness=4;` and then remove the `a.y_location="middle";` command. Run again the program. What is the result? (You can use separate paper for your explanation and to show the result).

4. Change the `plot2d3(n,x);` to `plot(n,x);`. What is the result? (You can use separate paper for your explanation and to show the result).

5. Type the following command and then compare it to the result of procedure B. 1.

```
-->n=-4:4;
-->u=[0 0 0 0 1 1 1 1 1];
-->a=gca();
-->a.thickness=2;
-->a.y_location="middle";
-->plot2d3(n,u);
-->xtitle('Graphical Representation of a Unit-Step
                                Signal','n','u[n]');
```

6. Change `a.y_location="middle";` to `a.y_location="origin";` and then add the syntax `mtlb_axis([-10 4 0 1.2]); xtitle('Graphical Representation of a Unit-Step Signal delayed by two samples','n','u[n]');`. What is the result? (You can use separate paper for your explanation and to show the result).

7. The previous figure is a representation of a unit step signal "delayed" by two samples. Change `u=[0 0 0 0 1 1 1 1 1];` to `u=[0 0 0 0 0 0 0 1 1];` and then run again the program. You will observe a unit step signal "delayed" by three samples.

PROCEDURE C: UNIT SAMPLE SIGNAL

1. Encode the following command and observe the output.

```
-->L=4;
-->n=-L:L;
-->x=[zeros(1,L),1,zeros(1,L)];
-->a=gca();
-->a.thickness=2;
-->plot2d3(n,x);
-->xtitle('Graphical Representation of a Unit-Sample
                                Sequence','n','x[n]');
-->mtlb_axis([-4 4 0 1.2]);
```

2. Type the following command and then compare it to the result of procedure C.1

```
-->n=-4:4;
-->s=[0 0 0 0 1 0 0 0 0];
-->a=gca();
-->a.thickness=2;
-->plot2d3(n,s);
-->xtitle('Graphical Representation of a Unit-Sample
                                Sequence','n','s[n]');
-->mtlb_axis([-4 4 0 1.2]);
```

3. Change `s=[0 0 0 0 1 0 0 0 0];` to `s=[0 0 0 0 0 0 0 1 0];` and run again the program. Observe the output. You will observe a unit sample discrete-time signal "delayed" by 3 samples. Now change `s=[0 0 0 0 0 0 0 1 0];` to `s=[0`

`0 1 0 0 0 0 0 0];` and run again the program. Observe the output. You will observe a unit sample discrete-time signal "advanced" by 3 samples.

PROCEDURE D: UNIT RAMP SIGNAL

1. Encode the following program and observe the result.

```
-->L=4;
-->n=-L:L;
-->x=[zeros(1,L), 0:L];
-->a=gca();
-->a.thickness=2;
-->a.y_location="origin";
-->plot2d3(n,x);
-->xtitle('Graphical Representation of a Unit-Ramp
                              Signal','n','x[n]');
```

2. Change `L=4;` to `L=10;`. Run again the program and observe the result. (You can use separate paper for your explanation and to show the result).

PROCEDURE E:EXPONENTIAL SIGNAL

1. Encode the following program and observe the result.

```
-->a=1.5;
-->n=1:10;
-->x=(a)^n;
-->a=gca();
-->a.thickness=2;
-->plot2d3(n,x);
-->xtitle('Graphical Representation of a Exponential
                              Signal','n','x[n]');
```

2. Make the variable n in the program negative and run again the program. Observe the result. (You can use separate paper for your explanation and to show the result).

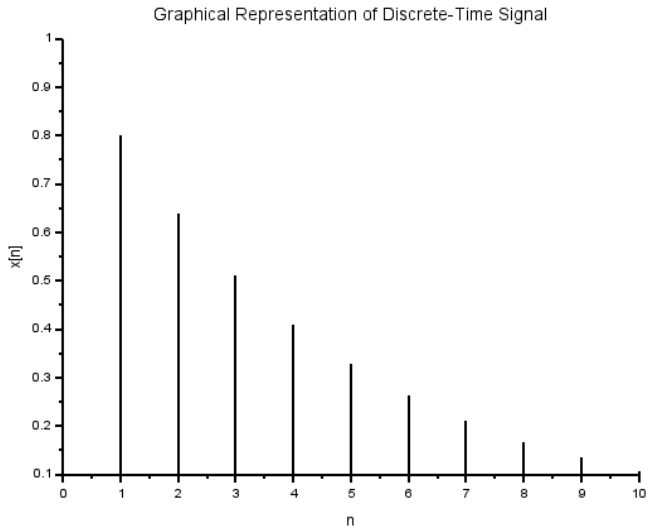
ANSWERS TO THE REPORT

1. Make a program of a unit step discrete-time signal with an "advanced" of 3 and 5 samples respectively. Use separate paper for your explanation and to show the result.
2. Compare the graph of a unit step and a unit sample signal In what applications does a unit step and unit sample signal used?
3. Make a program that will display a graphical representation of a decreasing and increasing exponential signal. Use separate paper for your explanation and to show the result.

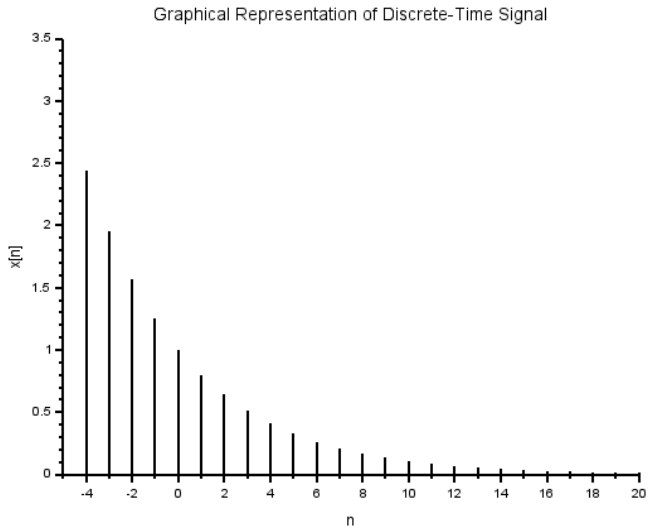
GAMEZ, ANDRE GIANNE G. **20190122340**
24/11/2022

PROCEDURE A:

1.
2.



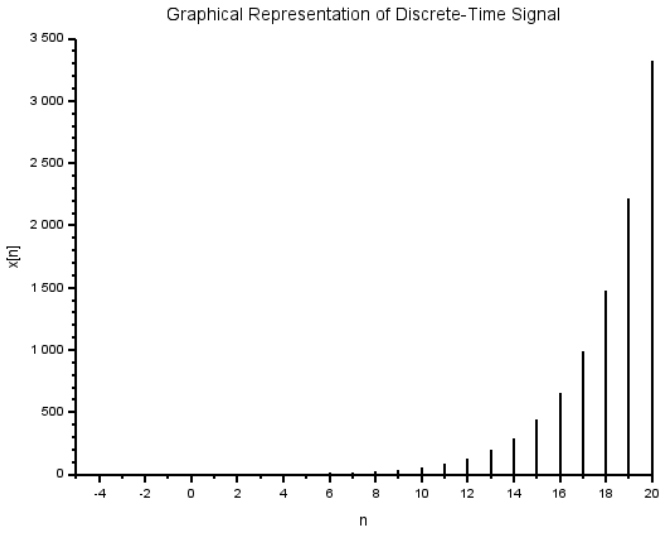
3.



OBSERVATION:

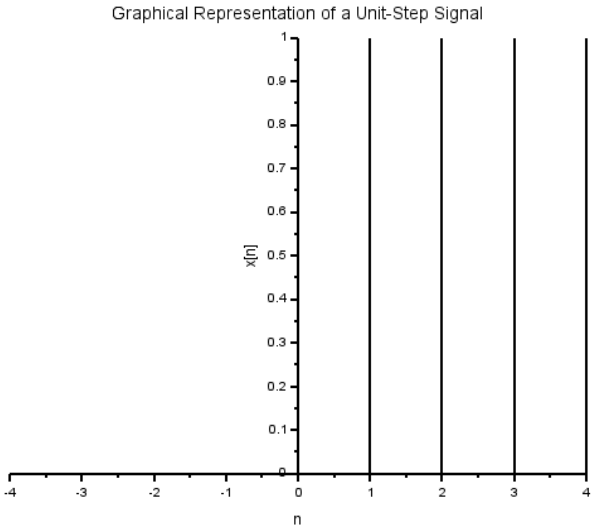
1. The signal generated is an exponential signal.

2. x=(1.5)^n:



PROCEDURE B:

1.



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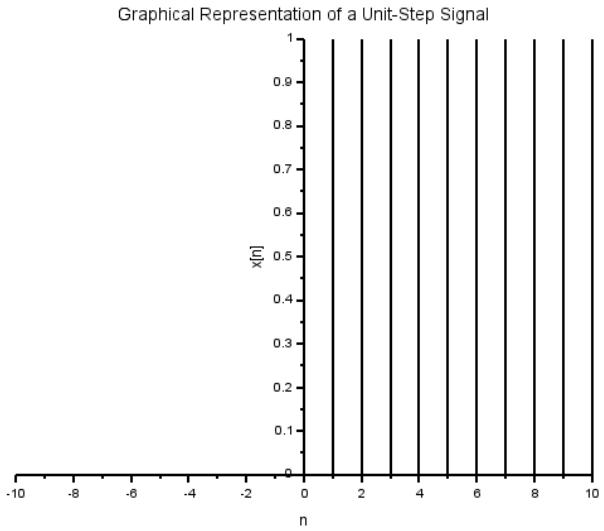
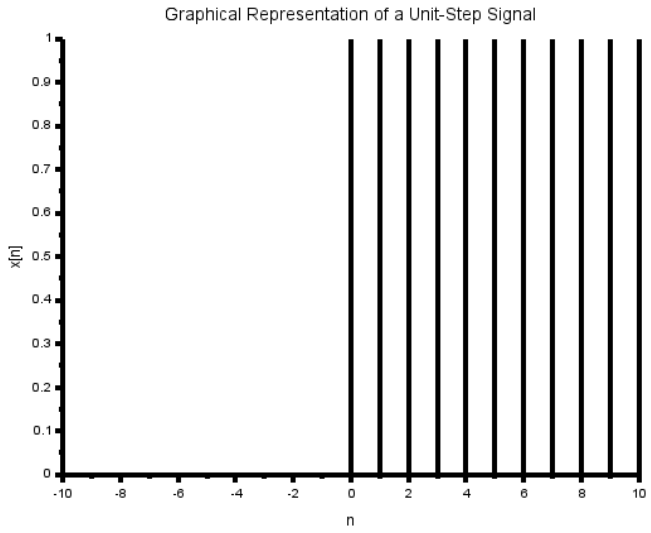
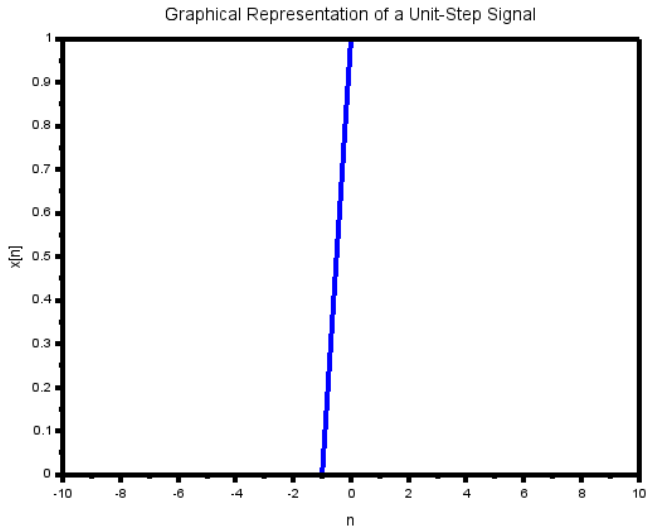


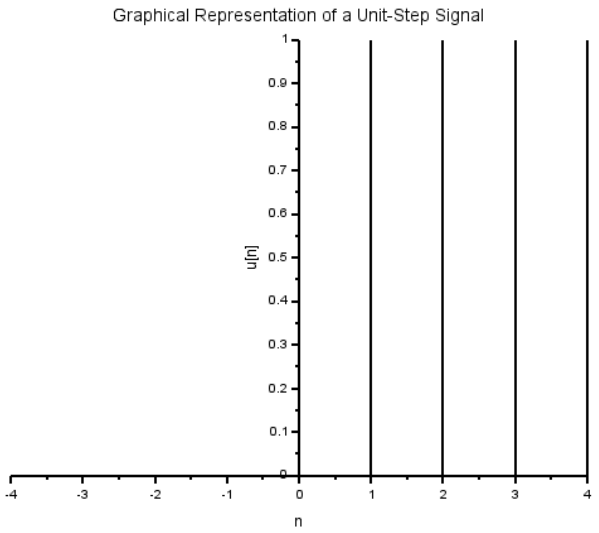
3.



4.

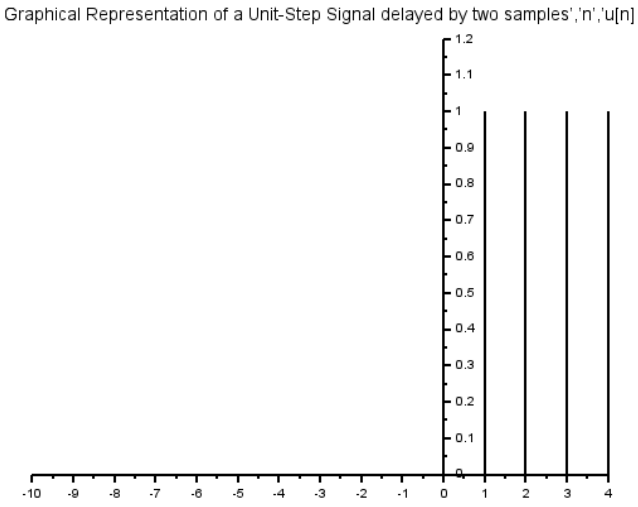


5.

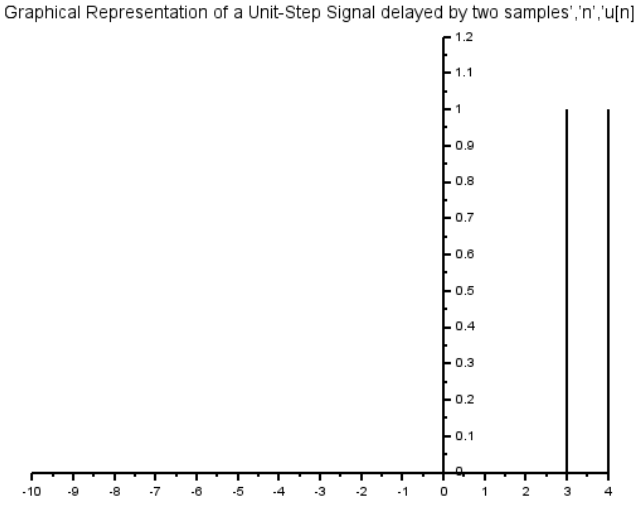


No notable changes in B.1.

6.

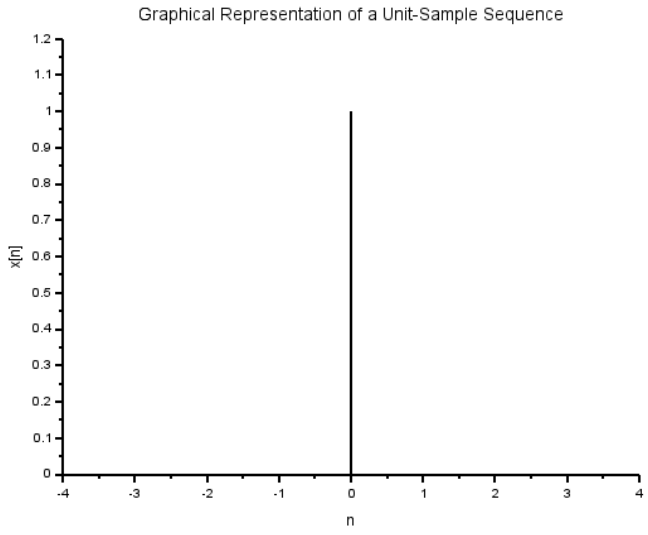


7.

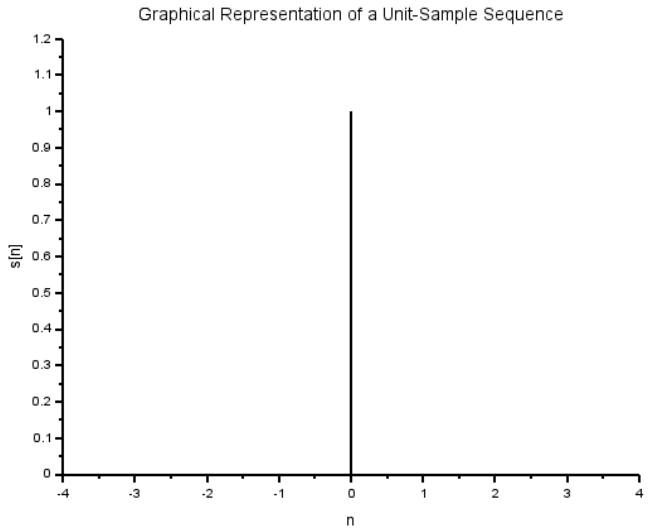


PROCEDURE C:

1.

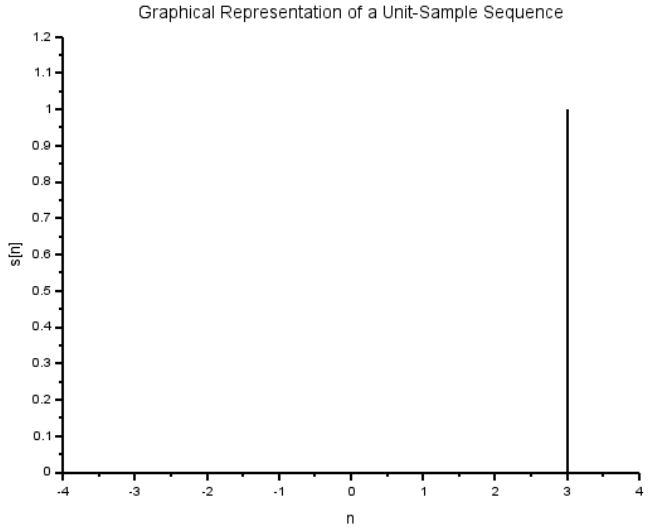


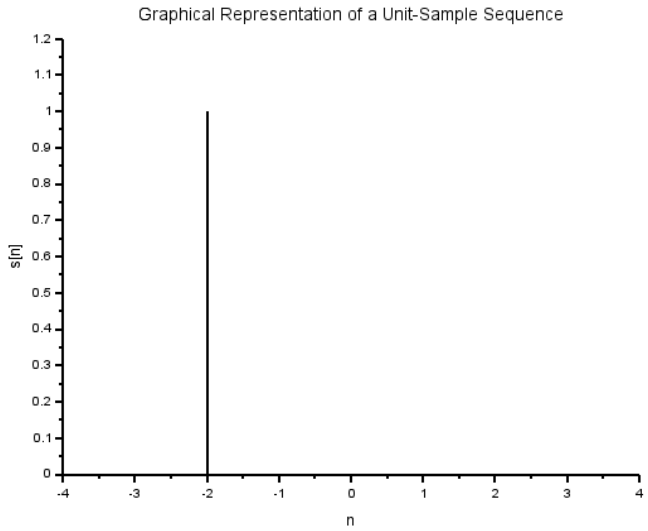
2.



No worthy note of changes

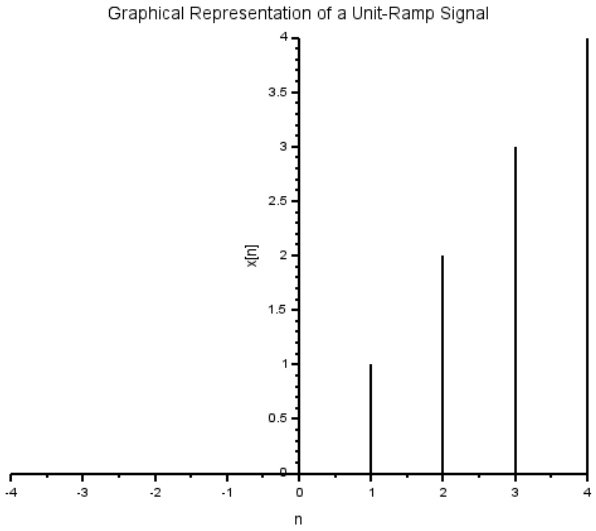
3.



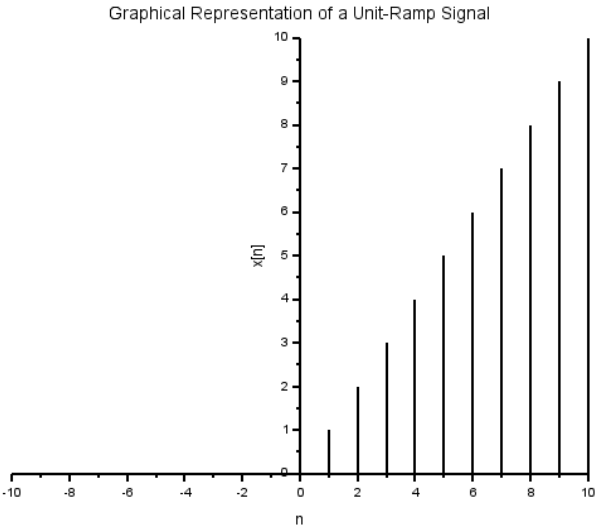


PROCEDURE D:

1.

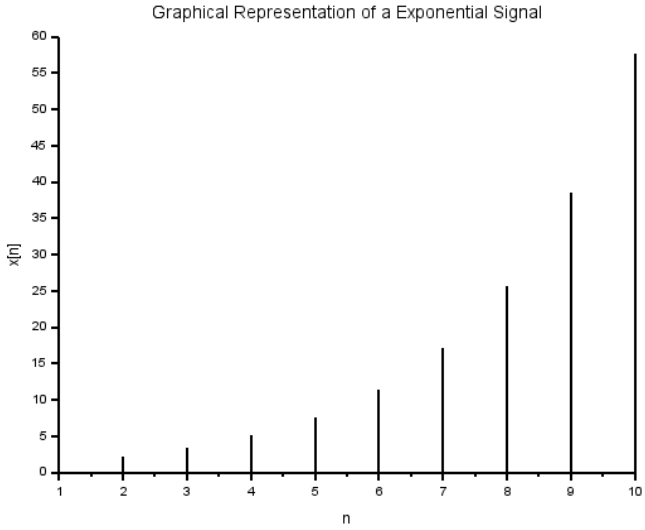


2.

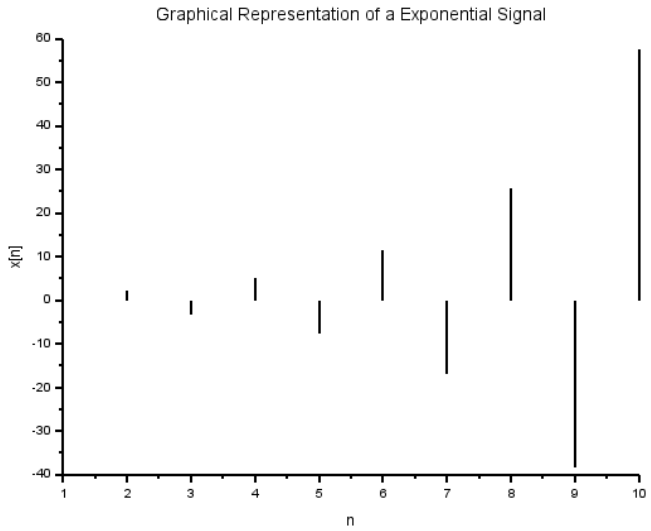


PROCEDURE E:

1.



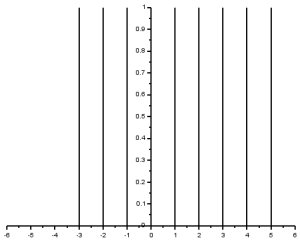
2.



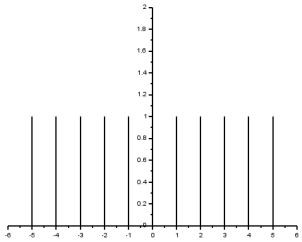
ANSWERS TO QUESTIONS:

1.

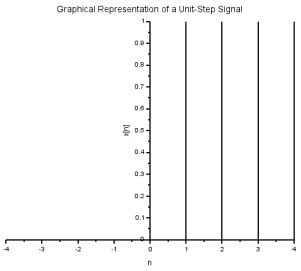
```
n=-5:5;
u=[0 0 1 1 1 1 1 1 1 1 1];
a=gca();
a.thickness=2;
a.y_location="middle";
plot2d3(n,u);
```

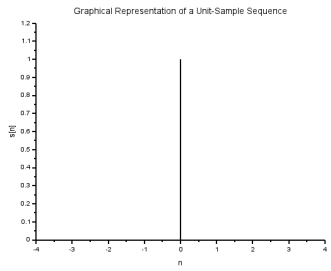


```
n=-5:5;
u=[1 1 1 1 1 1 1 1 1 1 1];
a=gca();
a.thickness=2;
a.y_location="middle";
plot2d3(n,u);
```



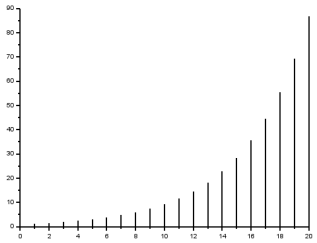
2.





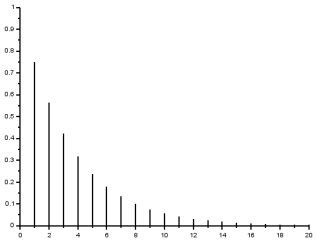
3.

```
1 n=-0:20;
2 x=(1.25)^n;
3 a=gca();
4 a.thickness=2;
5 plot2d3(n,x);
6
```



Increasing Exponential Signal

```
1 n=-0:20;
2 x=(0.75)^n;
3 a=gca();
4 a.thickness=2;
5 plot2d3(n,x);
6
```



Decreasing Exponential Signal